

## **Undergraduate projects and Supervised Machine Learning Applications.**

Supervised machine learning (ML) is a subfield of AI that focuses on training labeled datasets to develop AI models. These AI models can do either prediction or classification usually on unseen data. Supervised learning includes a wide variety of algorithms such as Linear regression, decision trees, Naive Bayes, Support vector machines, and Neural networks, each custom-made to specific types of tasks and data structures. The learning process involves feeding the model with input-output pairs, the the algorithm learns to map inputs to the correct output by minimizing the prediction error against the actual output.

Key applications of supervised learning span numerous domains, such as image and speech recognition, medical diagnosis, financial forecasting, and natural language processing, demonstrating its versatility and impact. The effectiveness of supervised learning models heavily depends on the quality and quantity of the labeled data, feature selection, and the ability to avoid over-fitting, ensuring the model generalizes well to new data.

The following are the possible projects of undergraduate studies in Computer science and Engineering.

1. Context understanding for Nepali Spelling and suggestions:  
Spelling correction systems mostly uses dictionary based entries to identify spelling errors in the text. Such system requires better understanding of words context to improve the accuracy of error detection and relevant suggestions. Students will explores the context representation algorithms and implements in the existing spelling suggestion system to evaluate against them.
2. Scheduling and Route planning especially for delivery and hospital services:  
Scheduling and route planning are fall under NP-Complete class of problems. So, solving these problems requires efficient algorithm for real time solutions. Many delivery services such as food delivery, goods delivery and so on are demanding such solutions. Job picking, finding efficient paths, building service schedules are the exploration area for students in their project works.
3. Graph data modeling for Academic activities, University Management System, e-KYC:  
Non-relational databases requires special set skills to represent data models but provides efficient as well as flexible set operations to aggregate, analyze and reporting facilities. These analytics provides better view of business/domain understanding for real life applications. Students will develops model for educational activities/events as well as reporting mechanism through graph based data networks.
4. Query generations from ontology graphs:  
In the area of software engineering, Peoples are trying to automate the software development process through ontology description of clients requirements. In typical scenario, Data models are generated from the ontology and the equivalent schema too. In such scenario, there are problems exist in the query generation part, such queries are of search, insert, update, delete, aggregation in types. These system are applicable to many applications such as e-commerce, medical softwares and so on. Student will explores and implement the query generation part in their work.
5. Smart contract based software development:

In the area of software development, smart contract based softwares are in demand around the globe. It requires distributed cluster based software architecture for modeling. Students will explores contract based requirements and implement through the distributed software development processes.

Finally, the time for hands on implementation of Supervised ML algorithm with Naive Bayes for language classification problem:

**Input:**

- a. Set of about 1000 words encoded in TTF fonts(Preeti, Kantipur) for Nepali language like खुवाउने, रमाए and so on.
- b. Set of about 1000 words encoded in TTF font for English language like enjoy, eat and so on.

**Output:**

for words : खुवाउने, रमाए	>> the language is Nepali.
For words : enjoy, eat	>> the language is English.

**Presenter:**

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